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(54) Title: FILTER ACCESSORY

(57) Abstract

An accessory (20) to be sandwiched between an internal combustion engine and an oil filter (5) therefor, comprises a housing having an inlet (21), an outlet (22) and magnetic means (27) arranged so that oil flowing through the oil filter (5) also flows past the magnetic means (27) to collect any metal particles suspended within the oil.

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FILTER ACCESSORY

The invention relates to a filter and more particularly to an accessory for use with a disposable oil filter of the type fitted to internal combustion engines and the like.

A conventional oil filter comprises an inlet and an outlet and a body of filtering material. A pressure relief valve may also be present which functions to bypass the filtering material in the event of a blockage. The trend towards longer service intervals on cars and the like means that such an event is more likely and can lead to the return of the filtered material to the engine. It is an advantage if especially metal particles are not returned to that engine. This is of especial importance in installations where the engine oil circulates with the gearbox, and many such particles are produced by wear of the gearbox components.

A conventional filtering arrangement of an internal combustion engine comprises an oil outlet in the form of a perforated wall on the sump. The oil return comprises a pipe which extends from within the engine through the perforated wall to protrude outside of the sump, where the pipe is externally threaded. The oil filter comprises a generally cylindrical housing having in one face inlet holes corresponding to the engine oil outlet holes. A

hole extends axially from that end face into the housing and the entrance thereof is internally threaded so that it may receive the oil return. In use, the filter is screwed on to the pipe and is sealed against the outer wall of the sump by means a resilient sealing ring on the end face of the filter.

According to a first aspect of the invention there is provided an accessory comprising a housing to be sandwiched between an internal combustion engine and an oil filter therefor, the housing including an inlet and an outlet and containing magnetic means arranged so that oil flowing through the oil filter also flows past the magnetic means, whereby particles suspended within the oil which are attracted by magnetic forces, are collected by the magnetic means.

Preferably the accessory comprises a short, open ended, cylindrical housing to be sealed between the wall of the sump of the engine and the adjacent end wall of the filter. A perforated wall preferably extends across within the housing and one or more magnets are secured to the wall. One of the perforated holes extends axially through the wall to receive the oil return pipe. The accessory is arranged so that oil flows from the engine into the housing and through the perforated wall before passing through the filter. The oil returns to the engine via the oil return pipe. Preferably the magnets are disposed on the downstream side of the wall and are arranged so that they do not

receive the full force of the oil flow which might otherwise scour or remove the adhered particles from the magnets.

In order that the invention may be better understood, it will now be described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a cross-sectional view of an assembly including an accessory of the invention;

Figure 2 is a view from one end of the accessory shown in Figure 1, and

Figure 3 is a view from one end of an accessory according to another embodiment of the invention.

As shown in Figure 1, an oil sump 1 is part of an internal combustion engine fitted to a vehicle (not shown). A perforated wall portion of the sump 1 has a plurality of circumferentially spaced apart outlet holes 2. An oil return pipe 3 extends through the perforated wall portion between the spaced apart holes 2 from within the engine to the outside of the sump. The outermost portion of the pipe 3 has external threads 4.

An oil filter 5 of known type comprises a cylindrical housing 6 having a plurality of circumferentially spaced apart inlet holes

7 formed in one end face 8. A central outlet pipe 9 extends through the housing 6 and the end - portion 10 adjacent the end face 8 has internal threads 10. Holes 11 are present within the wall of the pipe 9. A body of filter material 12 is present between the inner wall of the housing 6 and the oil return pipe 9. A pressure relief valve 13 is present adjacent the remote end of the pipe 9. A resilient sealing ring 14 is retained in an annular channel 15 about the end face 8 of the housing 6.

An accessory according to the invention is interposed or sandwiched between the end face 8 of the oil filter and the wall of the sump.

The accessory comprises a short cylindrical body portion 20 having an inlet 21 and an outlet 22. A resilient sealing ring 23 is located within an annular channel 24 about the inlet end face 21 and in use seals against the wall of the sump 1. The outlet end face 22 of the accessory seals in use against the sealing ring 14 of the oil filter.

An internal wall 25 extends across the body portion 20 and has spaced apart holes 26. As shown in Figure 2, there are four pairs of holes 26, each pair being spaced apart from the neighbouring pair by an angle of 90°. Four spaced apart bar magnets are secured to the downstream side of the wall 25 and are arranged so that a pole of each magnet 27 is disposed adjacent an

outlet hole 26. A hole 28 extends centrally through the wall 25 to receive the oil return pipe 3.

The accessory may be fitted simply by placing the central hole 28 of the accessory over the oil return pipe 3 with the sealing ring 23 adjacent the sump wall 23, and with the magnets facing outwardly. The filter is threaded onto the oil pipe 3 and tightened until the sealing ring 14 seals against the end face 22 of the accessory, and the sealing ring 23 of the accessory seals against the wall of the sump 1.

In the embodiment shown in Figure 3, the inlet holes comprise three arcuate slots 30 circumferentially spaced about the transverse wall 31. These generally rod-like magnets 32 are present, each extending alongside and between the ends of a respective slot 30.

In use, oil flows from the sump 1 and through the holes 2 into the inlet 22, 30 of the accessory. The oil then flows through the holes 26, 30 in the wall 25, 31. Because the poles of the magnets 27, 32 are disposed adjacent the holes 26, 30 any magnetic particles released by, e.g. wear of the engine or transmission will be subject to a strong magnetic force and attracted to the magnets 27, 30. Because the magnets are disposed on the outlet or downstream side of the wall, they are not subjected to a scouring action caused by the flow of oil and

metal particles collected by the magnet 27, 32 adhere to the sides of magnet.

The oil then passes through the inlet holes 7 of the oil filter, the body of filter material 12 and the holes 11 to the oil return pipe 3, from where the oil is drawn back into the engine by means of an oil pump or the like (not shown). In the event of a blockage within the filter or due to a fault within the pressure relief valve 13, oil can pass from the inlet 7 directly through the relief valve 13 to the oil return pipe 3, without passing through the body of filter material 12. In such a case and where an accessory is fitted, the presence of the magnets ensures that at least a proportion of the ferrous material is not returned to the engine, where the ferrous material may cause damage to the bearing surfaces of the engine.

Because the accessory is formed as a separate item from the oil filter, it may be removed during an oil change and the ferrous matter removed from the magnet before replacement. Furthermore, because the magnets are not integrally formed within the filter, they need not be discarded during each oil change.

CLAIMS

1. An accessory comprising a housing to be sandwiched between an internal combustion engine and an oil filter therefor, the housing including an inlet and an outlet and including magnetic means arranged so that oil flowing through the filter also flows past the magnetic means, whereby particles suspended within the oil which are attracted by magnetic forces are collected by the magnetic means.
2. An accessory according to Claim 1, characterised in that the housing is generally cylindrical and includes a transverse wall including perforations defining the oil inlet, a hole extending axially through the wall to receive the oil return pipe of the engine to define the oil outlet, and at least one magnet is secured to the wall.
3. An accessory according to Claim 2, characterised in that the magnet is secured to the downstream side of the transverse wall.
4. An accessory according to Claim 2 or 3, characterised in that eight perforations are arranged in four side-by-side pairs circumferentially spaced about the wall, and the magnets are disposed in the spaces between the pairs of

perforations each pole of each magnet being located adjacent a respective perforation.

5. An accessory according to Claim 2 or 3, characterised in that three arcuate slots are circumferentially spaced about the transverse wall to define the oil inlet, and three magnets are mounted, each extending alongside and between the ends of one of the slots.
6. An accessory substantially as described with reference to the accompanying drawings.

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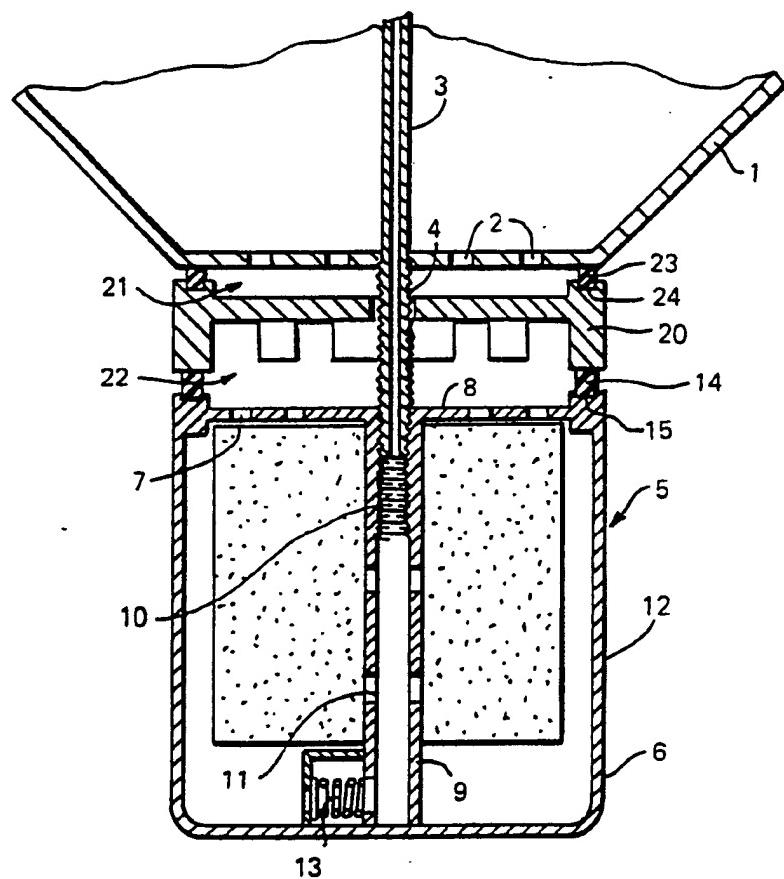


FIG.1

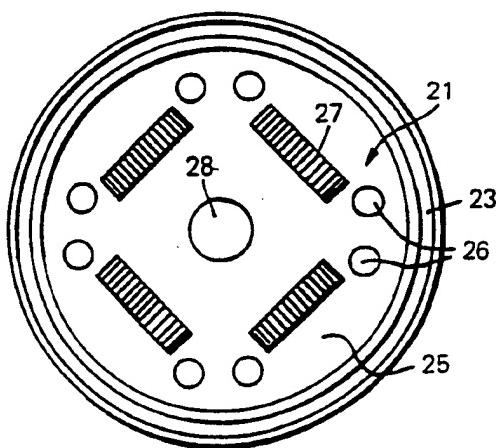


FIG.2

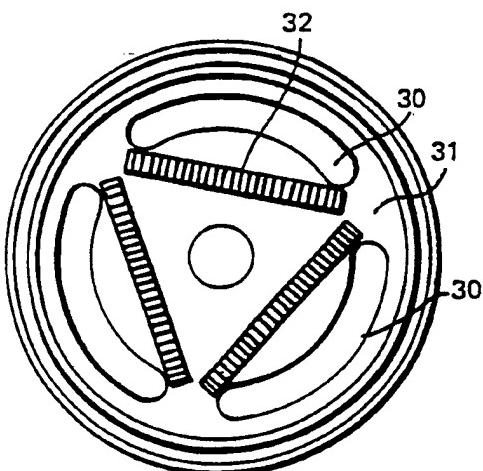


FIG.3

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 90/01425

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)<sup>6</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.C1. 5 F01M11/03 ; F16N39/06 ; B03C1/28

## II. FIELDS SEARCHED

Minimum Documentation Searched<sup>7</sup>

Classification System	Classification Symbols	
Int.C1. 5	F01M ;	F16N ; B03C

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US,A,4450075 (KROW) 22 May 1984 see column 4, lines 5 - 30; figures	1, 2, 6
A	---	4, 5
E, X	GB,A,2229118 (HALL) 19 September 1990 see the whole document ---	1-6

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

09 APRIL 1991

Date of Mailing of this International Search Report

30 MAY 1991

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

KOOIJMAN F.G.M.



**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

PCT/GB 90/01425

SA 40414

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4450075	22-05-84	None	-----
GB-A-2229118	19-09-90	None	-----